institutes, induction of new and attractive fellowships such as INSPIRE, strengthening infrastructure for R&D in universities, encouraging public-private R&D partnerships, national awards for outstanding R&D etc. Accordingly, the Government have enhanced Eleventh Plan allocation for Scientific Departments to Rs. 75,304.00 crores from Rs. 25,301.35 crores during Tenth Plan.

Forecast of monsoon

85. SHRI RAHUL BAJAJ: Will the Minister of EARTH SCIENCES be pleased to state:

(a) what has been the accuracy of long-term and short-term (say weekly) forecasts of monsoon rainfall by the Indian Meteorological Department in the last three years, for both total and division-wise spatial distribution; and

(b) the steps that are being taken to improve these forecasts?

THE MINISTER OF STATE OF THE MINISTRY OF EARTH SCIENCES (SHRI PRITHVIRAJ CHAVAN): (a) India Meteorological Department (IMD) issues various types of monsoon rainfall predictions to the users. Details of forecast verification are presented below:—

(i) Long range rainfall forecast for the southwest monsoon season (June-September) for the country as a whole and also for 4 homogeneous regions. The forecast is issued in 2 stages, first in April with the data up to March and the second by end of June with the data up to May.

Regions	2006		2007		2008	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
	(% of Long Period Average – LPA): Figures in Brackets indicate error bars of respective spatial domain forecasts)					
All India (June-September)	100	92(±4)	106	93(±4)	98	100(±4)
All India (July)	98	97(±9)	98	95(±9)	83	98(±9)
Northwest India	94	91(±8)	85	90(±8)	107	96(±8)
Northeast India	83	94(±8)	104	98(±8)	94	101(±8)
Central India	116	90(±8)	108	96(±8)	96	101(±8)
South Peninsula	95	97(±8)	126	94(±8)	96	98(±8)

(ii) Short range rainfall predictions, up to 3 days, are generated daily for all 36 Meteorological sub-divisions in the country. Average skill of rainfall predictions was found to be in the range of 71-96% during 2006; 72-92% during 2007 and 76-85% during 2008.

(iii) Medium range rainfall predictions (3-7 days) are generated for the whole country and based on which Agro-Advisory Service (AAS) covering 127 agro-climatic/zones (cluster of 4-6 districts) is operated twice weekly (Tuesdays and Fridays) with valid predictions for next 4-days. Average skill of rainfall predictions was found to be 62% during 2006. 63% during 2007 and 62% during 2008.

(b) Continuous improvement of weather forecasting services is the high priority activity for the agencies of the Ministry of Earth Sciences by continuously adopting methodologies and modeling frameworks that have undergone rigorous performance evaluation in operational R&D environment. Following are some the steps that are undertaken/underway:—

(i) An improved numerical prediction models with 50Km grid globally and 27Km over India are already implemented.

(ii) All available global satellite radiance data sets are being assimilated in the numerical models for improving the forecasts.

(iii) A multi-model Man-Machine-Mix approach using the forecasts from different models has been adopted for improving the forecast skill on experimental basis.

(iv) Focusing on strengthening the existing observational network with expansion, improving the forecasting methodology and quick dissemination of weather forecast assessments/warnings to the users, a comprehensive modernization programme is currently underway.

(v) Focused R&D initiatives on understanding and prediction of the Indian monsoon rainfall variability, increasing accuracies of medium nine weather predictions and potential predictability of monsoon are currently under implementation during the Eleventh Plan.

Delay in monsoon

86. SHRI RAJKUMAR DHOOT: Will the Minister of EARTH SCIENCES be pleased to state how widespread is the delay in monsoon this year and what impact has it had on sowing operations?

THE MINISTER OF STATE OF THE MINISTRY OF EARTH SCIENCES (SHRI PRITHVIRAJ CHAVAN): Southwest Monsoon-2009 has set in over Andaman Sea around its normal date on 20th May, 2009 but it advanced over Kerala earlier than its normal date (1st June) by about 8-days on 23rd May, 2009. Further advancement of Monsoon-2009 over parts of Karnataka, Coastal Andhra Pradesh, Rayalaseema, West Bengal and Northeastern States was realized by the 1st week of June. Subsequently, the monsoon advancement over other parts of the country was sluggish as monsoon entered into a weak phase of its activity. Details of delay in monsoon advancement so far realized are given below:—